Is there yet influenza virus A/H1N1 infection in Hamadan, Iran? : A cross-sectional serological study in lower the age of 16

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Abstract: Background: H1N1 virus is a novel subtype of influenza virus A. Sudden changes in this virus can make different clinical symptoms. So in this study we determine the prevalence of influenza virus A/H1N1 infection in children with the age <16 and clinical symptoms of them in Hamadan in 2010 and association of some laboratory tests with H1N1. **Methods:** Subjects with H1N1 influenza confirmed by enzyme-linked immunosorbent assay. Demographic characteristics, white blood cell counts and C-reactive protein were investigated. **Results:** Among a total of 180 individuals, H1N1 influenza confirmed in 115 subjects. 37.4% were men and 59.1% were within the 2-8-y age range. Urban residents were 67% and attendance at preschool or school there was in 61% of patients. Cough (88.7%) and fever (78.3%) were the most symptoms. Sore throat (49.6%), myalgia (30.4%), headache (20.9%) and rhinorrhea (17.4%) were in next rankings. There was not a significance association between WBC, CRP and positive H1N1 antibody (P=0.093 and P=0.74). **Conclusions:** However the prevalence of H1N1 is going to low but there are many cases recorded in cold seasons and children are at risk noticeable. Residence in urban and attendance at preschool or school elevate the disease risk. Cough and fever are the major complaint. Clinical tests such as CBC and CRP do not have great impact for diagnosing disease.
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1. Introduction

H1N1 virus is the subtype of influenza A virus that was the most common cause of human influenza (flu) in 2009. Some strains of H1N1 are endemic in humans and cause a small fraction of all influenza-like illness and a small fraction of all seasonal influenza A (H1N1) virus were detected in the United States (1,2) and Mexico (3) and the virus then deployed rapidly to other regions of the world. The 2009 H1N1 virus was including of genes from human, swine, and avian influenza viruses (4-6). After confirmation of human- to-human transmission of the virus in at least three countries in two of the six world areas defined by the World Health Organization (WHO), the WHO notified that this pandemic phase raised from 5 to 6, the highest level (7). Morbidity of this virus is high but it's mortality is low as far as hospitalized just 2 percent of patients (8). Iran reports first confirmed case of H1N1 swine flu in Jun 2009 in 16 years-old Iranian boy who lives in the US and was visiting Iran and after that transported this virus quickly. Although after this pandemic were low cases of this disease but there are cases recorded of this virus yet and since the novel viruses may be have different symptoms and clinical demographics so in this study we investigated of prevalence of influenza virus A/H1N1 infection in Hamadan, west of Iran in 2010 and clinical demographic of patients.

2. Methods

2.1. Case definition

This study was approved by ethics committee of research center of Be'sat hospital and all subjects gave their informed consent to participate in this investigation. In this cross sectional study participated all subjects (age < 16) that referred with upper and lower respiratory tract infections to Be'sat hospital in 2010 from September to March. Confirmation H1N1 virus infection in subjects did by enzyme-linked immunosorbent assay (ELISA) (G/M

1007, Vircell, Spain) using anti H1N1 antibody according to the manufacturer instruction.

2.2. Laboratory tests

After detection the patients, for data collection we surveyed clinical symptoms, influenza vaccination history, chronic disease history and attendance at preschool or school. Laboratory tests such as white blood cell (WBC) counts and C-reactive protein (CRP) were performed.

2.3. Statistical analysis

Variables and clinical characteristics frequency were presented, and was calculated the percentage of them. Association between WBC, CRP and positive H1N1 antibody was measured by correlation analyze. A P-value of less than 0.05 was considered to indicate statistical significance. All analyses did with SPSS software.

3. Results

A total of 180 individuals were enrolled; after confirmation H1N1 virus infection in subjects by Elisa assay, 115 patients (63.9%) participated in our study. Characteristics of patients with influenza A (H1N1) virus presented in table 1. The mean age of subjects was 8 years-old. There are similar infections in other family members in 38 subjects (33%).

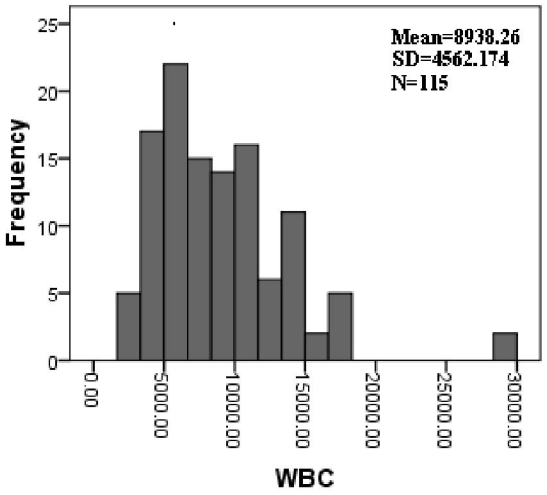
Table 1. Characteristics of patients and frequency of them

Vanable Variable	No.(%)
Gender Male Female	 43 (37.4) 72 (62.6)
Age group 2-8 Years 8-16 Years	 68 (59.1) 47 (40.9)
Type of residence Urban Rural	 77 (67) 38 (33)
Attendance at preschool or school	70 (61)
Seasonal flu vaccine history	0 (0)
Chronic disease	8 (7)

Presenting symptoms and results of the test are summarized in Table 2. The most symptoms of the subjects were Cough (88.7%) and fever (78.3%). In this study we measured WBC counts and CRP. We did not see any significant association between WBC, CRP and positive H1N1 antibody after correlate analyze (P=0.093 and P=0.74). The WBC distribution in our study population provided in graph 1.

Table 2. Clinical symptoms and tests of 115 cases of influenza A (H1N1)

Clinical symptoms and Tests	No.(%)
Cough	102 (88.7)
Fever	90 (78.3)
Sore throat	57 (49.6)
Myalgia	35 (30.4)
Headache	24 (20.9)
Rhinorrhea	20 (17.4)
CRP >10 miligram/liter	49 (42.6)
Leukocyte count < 4000/milimeter^3 > 10,000/milimeter^3	 9 (7.8) 42 (36.5)



Graph 1. WBC distribution in H1N1 influenza subjects

4. Discussion

H1N1 virus gene mutations lead to influenza with different symptoms. So identification these symptoms in each times in various region is important. Considering this symptoms physician can diagnose the patients and treat them. Since the main wave of the 2009 (H1N1) pandemic infected many more children than it did adults. So children are more in risk than adults. Although the prevalence of H1N1 influenza concretely into reduced but Positive cases are found in patients with upper and lower respiratory tract infection symptoms. Therefore in this study we surveyed the prevalence influenza virus A/H1N1 infection and clinical symptoms and tests in lower the age of 16 in Hamadan in 2010.

In our study the female and male subjects comprised 62.6 and 37.4 percent respectively. Mean

age of patients was 8 years old and 59.1% were within the 2-8-y age range. According to our results the children with lower age are more in risk in other words with increasing age decreases the risk of flu. 67 percent of population was urban. Among the cases 61% attended at preschool or school. Considering that the flu epidemic is a spread epidemic so attendance at preschool or school can increase risk of development. None of the subjects have seasonal flu vaccine history and just 7% of them have chronic disease. Li et al in 2011 in a study about epidemiological investigation of an outbreak of pandemic influenza A (H1N1) reported that female subjects with influenza A are higher than males (9). This feature was also noticed by other researchers (10-14). However Afzali et al presented that sexes were equally distributed (16) and in Cao et al study male subjects expressed higher (17). Urban community had more catching to H1N1 virus in other studies that is similar to our result (11,18). A study in Iran with Salehi et al rate of chronic disease was 37.5% (12). Other studies reported high levels of underlying condition such as asthma, hypertension, diabetes, COPD, coronary heart disease (CHD) etcetera in persons with H1N1 influenza (13,15,17,19) so that in Skarbinski et al asthma was the most common coexisting condition seen in children (24%) (14). These results are different to us that reasons can be age of our patients (< 16 years-old) and various regions studied. The young sample size of our subjects justifies small chronic disease in this perusal.

In the present study we describe patient's symptoms and the most common were cough (88.7%) and fever (78.3%). Other symptoms such as sore throat (49.6%), myalgia (30.4%), headache (20.9%) and rhinorrhea (17.4%) were in next rankings. Other studies indicated that cough and fever are most common symptoms but another symptoms according to the region studied are different (14,17,19). Our result is similar to Witkop et al at U.S. (20). They reported that sore throat, headache, body ache and rhinorrhea placed after cough and fever respectively. In various studies described other symptoms such as diarrhea, vomiting, Fatigue but in this study we pointed the symptoms that most physicians diagnosed based on them. The studies in Iran confirmed our results. As far as cough, fever, sore throat, myalgia and rhinorrhea are the most common symptoms in H1N1 patients (12,16,21). In Gooya et al study about influenza A (H1N1) pandemic in Iran, fever and cough were the major complaint of patients and myalgia placed in after them (22).

After measurement of CRP and WBC counts in positive H1N1 persons we did not observe any significant association with H1N1 antibody titers and them although patients had elevated levels of CRP. So that among the CRP of subjects, 42.6% were >10 and 36.5% of the patients had leukocytosis. Leukopenia subjects were 7.8%. The studies presented conflicting results. In a study in China the cases with leukopenia were higher than leukocytosis subjects and CRP level higher than 10 mg/liter observed in 31.3% of cases (17). Also Jain et al reported that patients with leukopenia are higher (19). Nevertheless our results have been repeated (13,14). As well as in a study in Iran there was not a significant association between WBC counts and prevalence of H1N1 (12).

We know that the most sensitive test for influenza detection and differentiation of subtypes of influenza A is RT-PCR and it can be our limitation of our study but according to Glikmann et al study the reported ELISA appears to be a rapid and cheap method for diagnosis and epidemiological studies of influenza-A infections (23). Future studies can be done with a larger sample size and in a longer period.

However the prevalence of H1N1 is going to low but there are many cases recorded in cold seasons and children are at risk noticeable. Residence in urban and attendance at preschool or school elevate the disease risk. Cough and fever are the major complaint and clinical tests such as CBC and CRP do not have great impact for diagnosing disease.

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